

May, 1967

Dear Member:

Any computer can perform only certain basic operations, and the language in which it may be instructed--called machine language--is correspondingly primitive. To bridge the communications gap between man and machine, scores of intermediate languages have been developed. Some of these languages, such as FAP, CODAP and AUTOCODER, have a close relationship with the machine language, and their translators are called assemblers.

More advanced languages, such as FORTRAN, MAD, ALGOL, COBOL and PL/1, are easier for man to use. Translators for these, usually called compilers, must often perform quite complex transformations in order to produce machine-language programs.

This month's Main Selection,

An Introduction to Algorithmic Methods Using
the MAD Language

by Alan B. Marcovitz and Earl J. Schweppe,

is a comprehensive manual of methods for the implementation of algorithms on a computer using the MAD language. (MAD stands for Michigan Algorithm Decoder and takes its name because it was first developed at the University of Michigan.) MAD is an advanced language with many excellent characteristics both in simplicity of form and clarity of expression.

Relatively easy to learn, MAD can be quickly and easily translated into basic machine language. More important, the responses of the MAD compiler to the user, especially in those cases where he makes an error, are more clear and helpful than is the case with many other compilers.

The authors of An Introduction to Algorithmic Methods Using the MAD Language have structured their newly published book with the needs of the user in mind. In order to allow almost immediate use of the computer, the basic features of the MAD language are presented in the very first chapter. Chapter Two is a detailed description of the organization and properties of computers in general. The third chapter introduces a metalanguage (an intermediate language or notation) so that the syntax of the MAD language may be formally defined and described throughout the text, rather than having to depend completely upon definition by example. Such a formal approach also helps to prepare the user for the learning of other computer languages. Numerous examples and flowcharts are included to aid in understanding the formal definitions.

The fourth chapter covers the basic arithmetic operations and the remarkably simple MAD symbols used to signify these operations. With this foundation established, rather complex processing of data now becomes possible. But the true power of the digital computer cannot be realized until branching (the selection of alternate paths dependent upon the truth

(continued on back page)

An Introduction to Algorithmic Using the MAD Language

by Alan B. Marcovitz, Ph.D. and Earl J. Schweppe,
Department of Electrical Engineering Computer Science Center
University of Maryland University of Maryland

a comprehensive manual of methods for the implementation of algorithms on a computer using the advanced MAD language

Here is a handbook written specifically to introduce those methods which are applicable to the implementation of algorithms on computing machines. It is designed to present those factors which are involved in effectively solving problems with the aid of a computer, and to relate them to other analytic techniques. Factors discussed include: the structure of the available input data and the desired results; the structure and efficiency of the computational algorithm which describes the process of getting from the input to the results; the linguistic means of expressing this algorithm to the computer; the capacity and weakness of computers; the problems involved in debugging and running the algorithm on a computer; and finally, the careful verification of the results to assure that they are meaningful.

A discussion of the characteristics of algorithms and an introduction to flowcharts for describing them are presented first. In order to allow almost immediate use of the computer, the basic features of the MAD

language are also included. The organization and properties of the language is described in detail. The language may be formed by relying completely on the approach also helps prepare computer languages. Numerical aid in understanding the use of the language are introduced which they make available. Many of the basic techniques used for this purpose. The book includes complete flowcharts and verification of the results.

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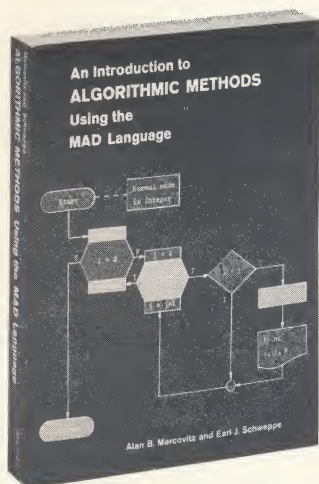
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able are illustrated with example problems.
iques of numerical methods are discussed and
The example problems are carefully analyzed
ts and programs for their solution being in-
inally, the efficient use of the computer and the
ts are stressed throughout the text.

—from the *Preface*

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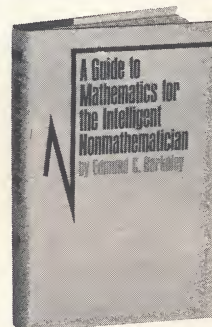
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Utilizing a completely new and fresh approach, Edmund C. Berkeley, distinguished author of numerous books in the computer and information sciences, has written an impressive work that encompasses the entire scope of "the queen of sciences," mathematics.

Its title, A GUIDE TO MATHEMATICS FOR THE INTELLIGENT MATHEMATICIAN, may be misleading, for this information-packed volume is for everyone, specialist or non-specialist. It is a marvelously lucid explanation of the capabilities and the potential of the powerful tool that is mathematics.

Computers, of course, have taken over enormous quantities of the monotonous drudgery of mathematical calculations. Computers now make possible operations that would never have been attempted in the past. And computers are speeding every conceivable task from the preparation of payrolls to the launching of space rockets. Yet the raw material and the basic data that are fed into computers is still essentially mathematical in nature and format.

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value of logical or Boolean expressions) and repetitive processes (the performance of the same set of instructions repeatedly) are utilized. These two important features are introduced in Chapters Five and Six.

The seventh chapter of An Introduction to Algorithmic Methods Using the MAD Language is devoted to those routines (designated as "subroutines") that are intended to be called into use by other routines. There are two aspects to subroutines: the development or writing of the subroutine itself and the call or use of the subroutine for another routine. Since the most commonly required subroutines have already been written and are readily available, the authors have paid particular attention to how to call or use such subroutines.

The eight and final chapter, entitled "Arrays, Matrices and Linear Equations," describes how arrays of variables of various dimensionalities in the MAD language can handle problems for machine solution.

Eight appendices--making up almost one-fourth of the book--complete An Introduction to Algorithmic Methods Using the MAD Language. These include such useful information as abbreviations of key phrases in MAD, debugging and testing techniques, selected MAD library subroutines, some special input and output statements, additional statements that give the MAD language greater versatility, a syntax summary of the MAD language, and a list of complete algorithms covered in the book, together with their page references.

The MAD language has been designed for mathematical, scientific and engineering computations, with a strong accent on logical and symbolic relationships. Compared to FORTRAN and other languages, the number of trivial and arbitrary rules has been reduced to a minimum in the MAD language. Among its strong points are the readability of the source program as well as the simplification of input and output.

The design of MAD was originally based in part upon ALGOL 58, with various niceties added by the developers, Bruce W. Arden, Bernard A. Galler and Robert M. Graham, of the University of Michigan.

It was first implemented on the IBM 704 and later converted for the IBM 7090, 7094. More recently it has been modified at the City College of the City University of New York to operate on the IBM 7040, 7044. It has been used at the University of Houston, the University of Maryland, Massachusetts Institute of Technology, the University of Pittsburgh, and, of course, the University of Michigan.

MAD reads easily and naturally, its decision-making features are quite general and powerful, its compiler is fast--and informative in the case of programming errors--and the keypunching of programs and data for it is well adapted to available equipment. For these reasons, members of The Library of Computer and Information Sciences will find An Introduction to Algorithmic Methods Using the MAD Language a highly useful manual for the use of this powerful tool.

Sincerely yours,

Martin Reynolds

Martin Reynolds
Executive Director



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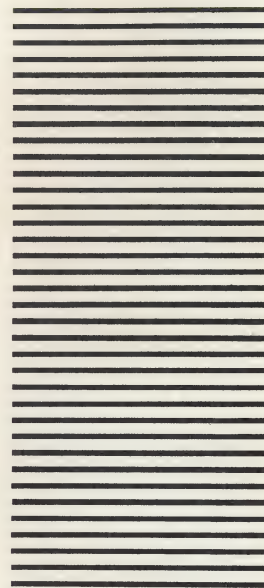
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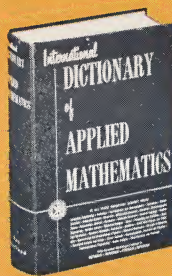
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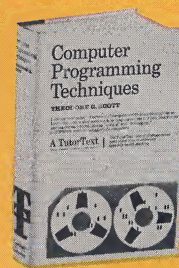
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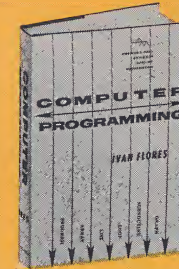
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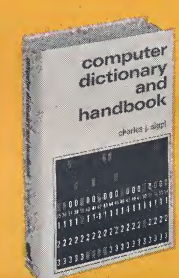
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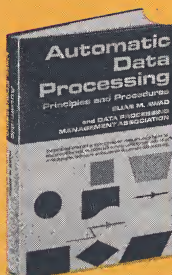
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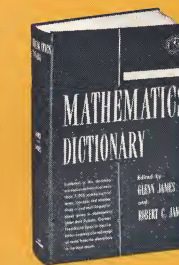
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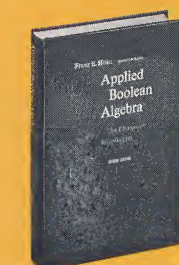
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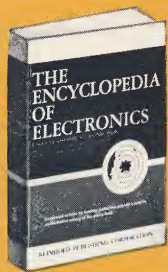
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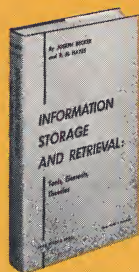
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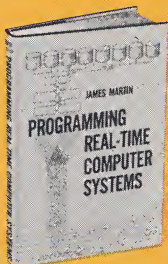
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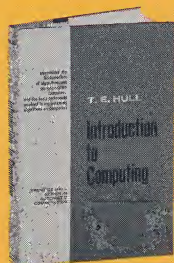
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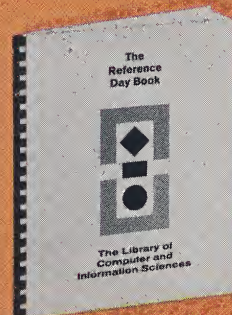
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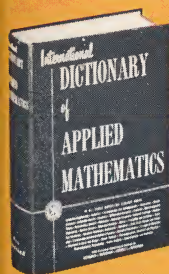
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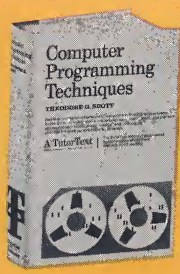
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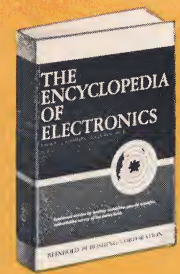
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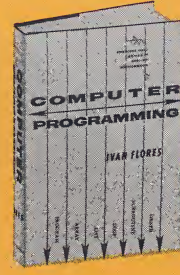
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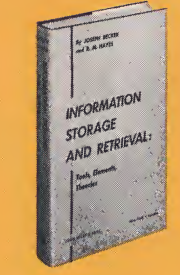
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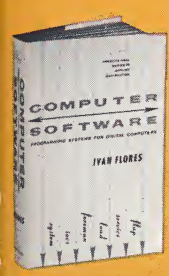
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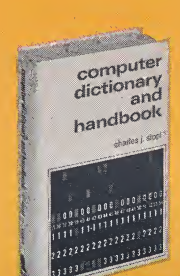
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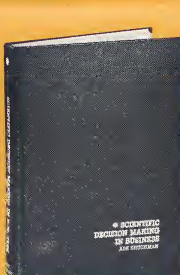
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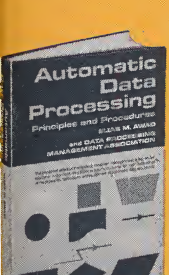
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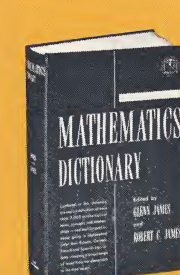
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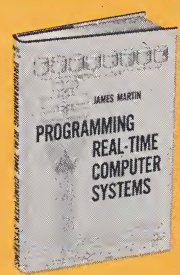
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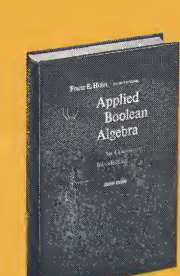
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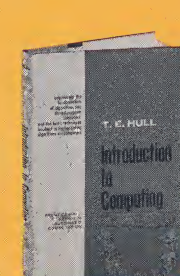
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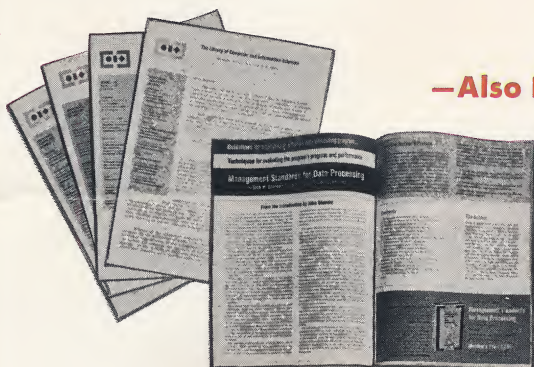
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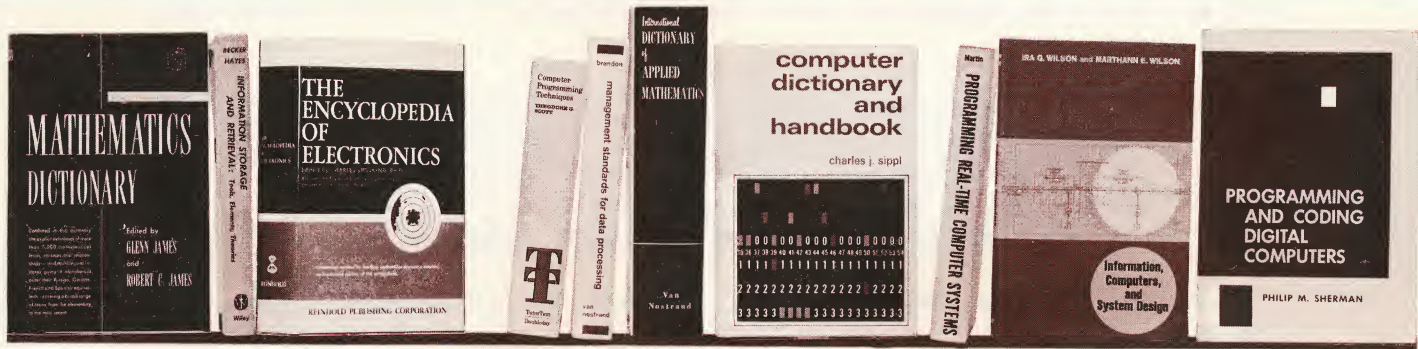
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